

Advanced radiometer for cloud liquid water and aircraft icing detection, Phase I

Completed Technology Project (2005 - 2005)



Project Introduction

Aircraft icing continues to be one of the major safety and operational concerns of the FAA, elements of the military, and the foreign military and civilian counterparts. Attempts to develop methods to directly detect aircraft icing meteorological conditions have met with mixed success. Combining microwave radiometers with radars has shown great promise, but deficiencies of the radiometers have limited their value. In this proposed effort we will develop a fast sampling multifrequency profiling and dual polarization narrow beam radiometer system to overcome these deficiencies. In this proposed radiometer system, all beams are collinear and match the antenna gain pattern of weather research radars. The radiometer will have the capability of profiling (ranging) water vapor along the beam as well as discriminate ice and water phase hydrometeors. We will also develop a fast beam steering system to operate in concert with the radar. Phase II will produce a turnkey radiometric system, ready to deploy.

Anticipated Benefits

Potential NASA Commercial Applications: The radiometric system developed herein, as well as being a valuable research tool, is to be operated with NEXRAD and Terminal Doppler Weather Radars (TDWRs) to detect and quantify cloud liquid water and ice in single- and mixed-phase conditions. In addition to detecting aircraft icing conditions, this quantification will enhance weather nowcasting and predictive capabilities. **Potential Non-NASA Commercial Applications:** NASA Glenn is actively researching methods of detecting aircraft icing conditions, and has performed and participated in a number of aircraft icing studies with their Twin Otter, radiometers, radar, and other sensing systems. The technology proposed herein greatly enhances the value of the important radiometric observations by enabling measurements that match the research radars at a number of radiometric frequencies.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

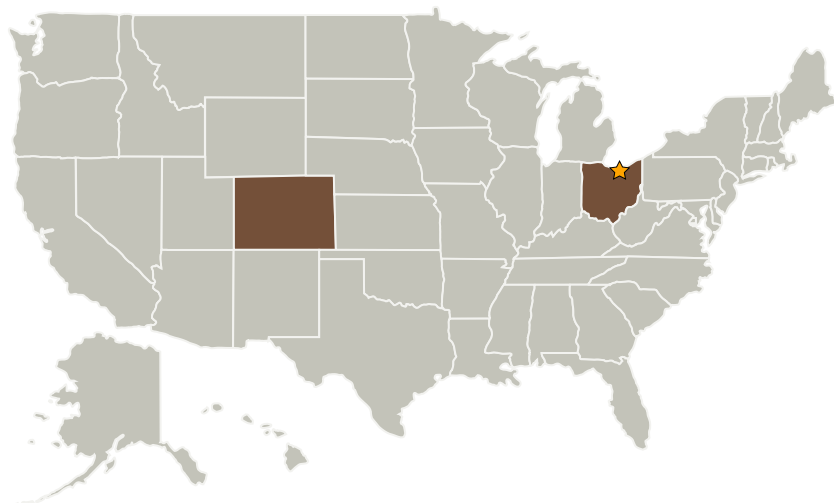
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Radiometrics Corporation	Supporting Organization	Industry	Boulder, Colorado

Primary U.S. Work Locations

Colorado	Ohio
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Managers:

Michael L Coats

Andrew Reehorst

Principal Investigators:

Fredrick S Solheim

Charles Elachi

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.3 Aero Propulsion
 - └ TX01.3.11 Engine Icing